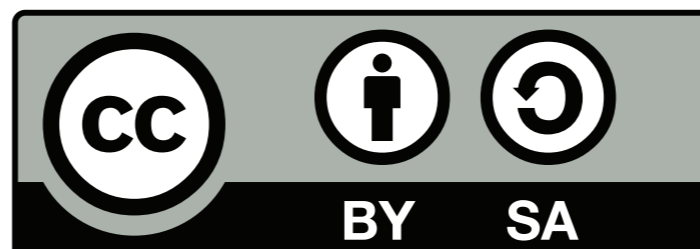


Tecnologia e Applicazioni Internet 2008/9

Lezione 5 - JavaScript

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A simple demo

```
<script type="text/javascript" charset="utf-8">  
  function factorial(n) {  
    if (n == 0)  
      return 1;  
    else  
      return n * factorial(n-1);  
  }  
  ...
```

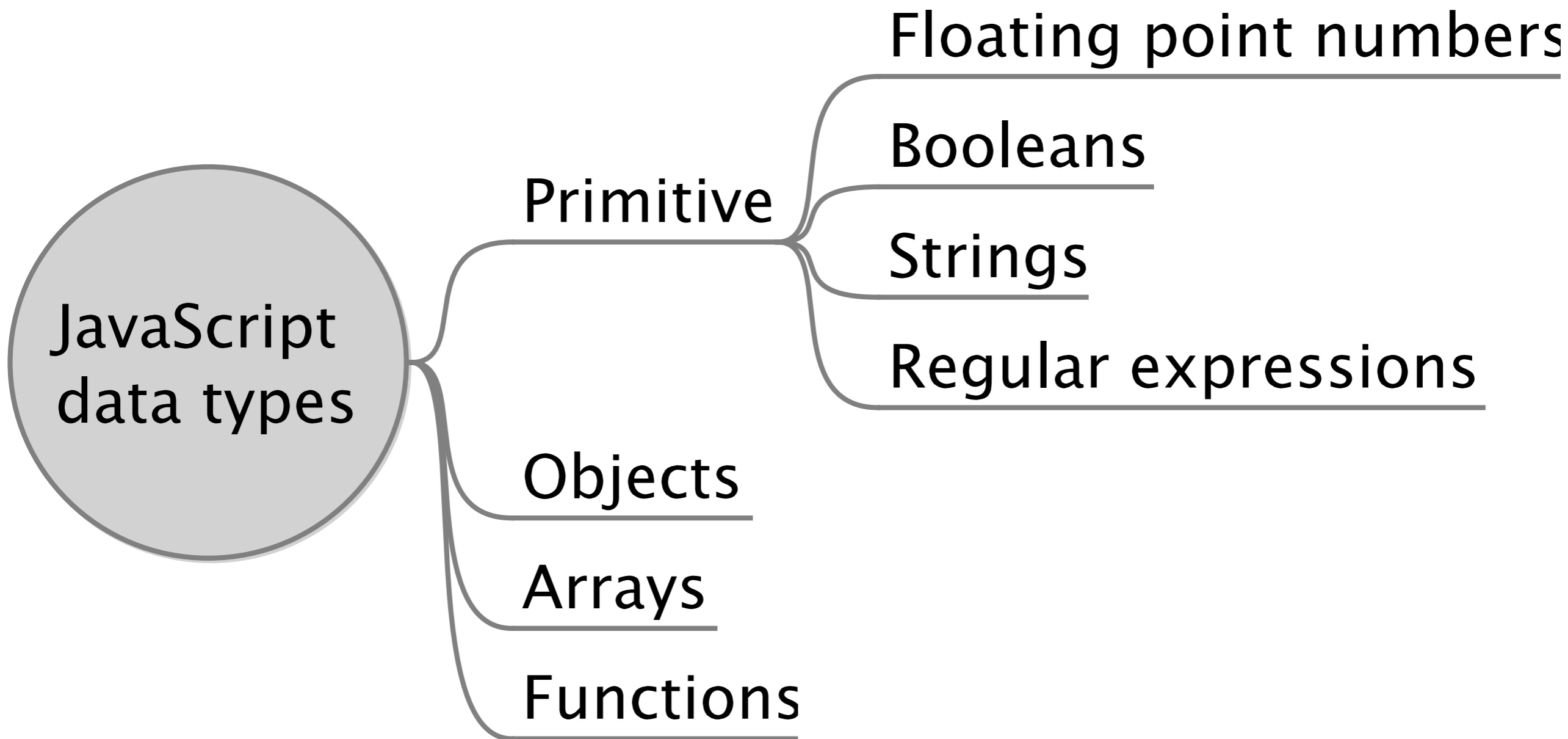
```
function table_row(cell0, cell1, cell2) {  
    return "<tr><td>" + cell0 + "</td>" +  
           "<td>" + cell1 + "</td>" +  
           "<td>" + cell2 + "</td></tr>";  
}
```

```
document.write("<table>")
for (i=0; i<30; i++) {
    document.write(table_row(i + "!", "=", factorial(i)));
}
document.write("</table>")
</script>
```



0! = 1
1! = 1
2! = 2
3! = 6
4! = 24
5! = 120
6! = 720
7! = 5040
8! = 40320
9! = 362880
10! = 3628800
11! = 39916800
12! = 479001600
13! = 6227020800
14! = 87178291200
15! = 1307674368000
16! = 20922789888000
17! = 355687428096000
18! = 6402373705728000
19! = 121645100408832000
20! = 2432902008176640000
21! = 51090942171709440000
22! = 1.1240007277776077e+21
23! = 2.585201673888498e+22
24! = 6.204484017332394e+23
25! = 1.5511210043330986e+25
26! = 4.0329146112660565e+26
27! = 1.0888869450418352e+28
28! = 3.0488834461171384e+29
29! = 8.841761993739701e+30

```
<script type="text/javascript" charset="utf-8">  
  function factorial(n) {  
    if (n == 0)  
      return 1;  
    else  
      return n * factorial(n-1);  
  }  
  
  function table_row(cell0, cell1, cell2) {  
    return "<tr><td>" + cell0 + "</td>" +  
          "<td>" + cell1 + "</td>" +  
          "<td>" + cell2 + "</td></tr>";  
  }  
  
  document.write("<table>")  
  for (i=0; i<30; i++) {  
    document.write(table_row(i + "!", "=", factorial(i)));  
  }  
  document.write("</table>")  
</script>
```



JavaScript data types

Primitive

Floating point numbers

Booleans

Strings

Regular expressions

Objects

Arrays

Functions

JavaScript objects are *maps*

```
var an_object = {};
```

```
an_object.foo = "bar";  
an_object["pi"] = 3.14159;
```

```
this.assertEquals("bar", an_object.foo);  
this.assertEquals("bar", an_object["foo"]);  
this.assertEquals(3.14159, an_object.pi);
```


Functions

```
function square(x) {           // a named function
    return x*x;
}

var cube = function(x) {      // a function literal
    return x*x*x;
}

// they can be used in the same way
this.assertEquals(9, square(3));
this.assertEquals(8, cube(2));
```

Functions as properties

```
var an_object = {};
```

```
an_object.a = 6;
```

```
an_object.b = 7;
```

```
an_object.times = function() {  
    return this.a * this.b;  
}
```

```
this.assertEquals(42, an_object.times());
```

JavaScript Object Notation (JSON)

```
var an_object = {  
  a: 256,  
  b: 256,  
  times: function() {  
    return this.a * this.b;  
  },  
};  
  
this.assertEquals(65536, an_object.times());
```

Constructor functions

```
function Teacher(name, subject) {  
    this.name = name;  
    this.subject = subject;  
}
```

```
var pippo = new Teacher("Pippo de Pippis", "epistemologia");  
var paperino = new Teacher("Paolino Paperino", "astronavigazione");
```

```
this.assertEquals("epistemologia", pippo.subject);  
this.assertEquals("Paolino Paperino", paperino.name);
```

Methods and prototypes

```
function Teacher(name, subject) {  
    this.name = name;  
    this.subject = subject;  
}
```

```
var pippo = new Teacher("Pippo de Pippis", "epistemologia");  
var paperino = new Teacher("Paolino Paperino", "astronavigazione");
```

```
Teacher.prototype.description = function() {  
    return this.name + " insegna " + this.subject;  
}
```

```
this.assertEquals("Paolino Paperino insegna astronavigazione",  
    paperino.description());  
this.assertEquals("Pippo de Pippis insegna epistemologia",  
    pippo.description());
```

Attach a method to an object

```
function Person(name) { this.name = name; }
var pippo = new Person("Pippo");

// associo il metodo al "prototipo" del costruttore
Person.prototype.sayHello = function() {
    return "Ciao da " + this.name;
}
this.assertEquals("Ciao da Pippo", pippo.sayHello());

// associo il metodo a un oggetto
pippo.toUpper = function() {
    return this.name.toUpperCase();
}
this.assertEquals("PIPP0", pippo.toUpper());
```

Prototype inheritance

```
function User(name, password) {  
    this.name = name;  
    this.password = password;  
}  
// User estende Person  
User.prototype = new Person();  
  
var pluto = new User("Pluto", "secret");  
this.assertEquals("Ciao da Pluto", pluto.sayHello());
```

Problema: classi e oggetti

Arrays

```
var a = new Array();
```

```
a[0] = 123;
```

```
a[1] = "foo";
```

```
this.assertEquals(123, a[0]);
```

```
this.assertEquals("foo", a[1]);
```

```
this.assertEquals(undefined, a[2]);
```

```
b = [123, "foo"];
```

```
this.assertEquals(a, b);
```

Example: *map*

```
function map(f, elems) {  
    var result = new Array(elems.length);  
    for (i=0; i<elems.length; i++) {  
        result[i] = f(elems[i]);  
    }  
    return result;  
}
```

```
function square(x) { return x*x; }
```

```
this.assertEquals([1,4,9], map(square, [1,2,3]));
```

Problem: reduce

Two ways to execute JavaScript in the browser

```
<script type="text/javascript">  
  alert("hello!");  
</script>
```

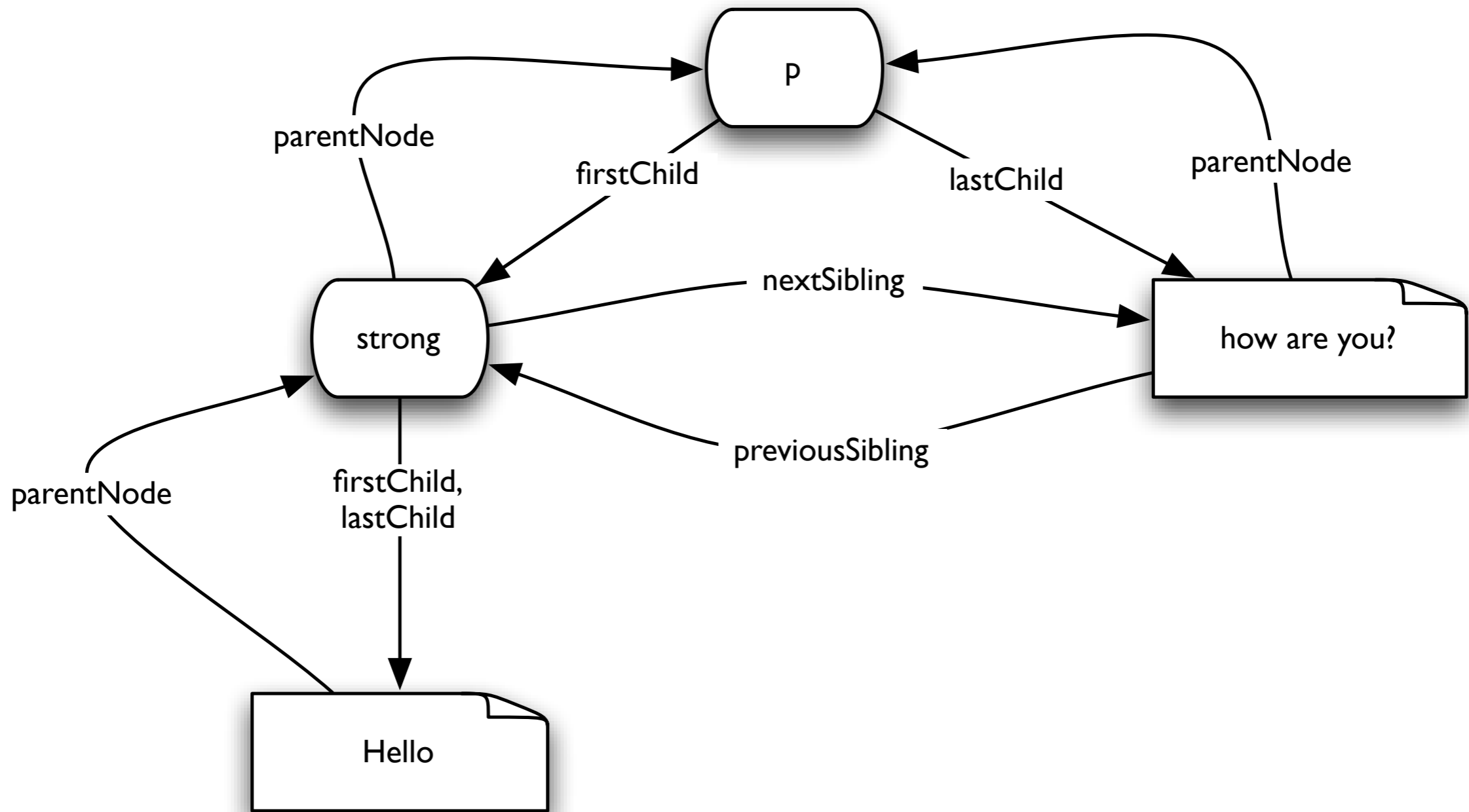
```
<script type="text/javascript" src="lib/testcase.js"></script>
```

What JavaScript can't do

- Access the file system
- Open arbitrary sockets

The Document Object Model

<p>Hello how are you?</p>



```
<html>
  <head>
    <title>Hello</title>
  </head>
  <body>
    <h1 id="hello">Hello, World!</h1>
    ...
  </body>
</html>
```

```
// how to access the h1 element? This does not work!!
document.documentElement // returns the html element
  .firstChild           // should return the head element?
  .nextSibling          // should return the body element?
  .firstChild           // should return the h1 element?
```

The first child of the *html* element is a **whitespace** text node!


```
function next(elem) {
  do {
    elem = elem.nextSibling ;
  } while (elem && elem.nodeType !== 1);
  return elem;
}
```

```
function first(elem) {
  elem = elem.firstChild;
  if (elem && elem.nodeType !== 1) {
    return next(elem);
  } else {
    return elem;
  }
}
```

```
var h1 = first(next(first(document.documentElement)));
this.assertEquals("Hello, World!", h1.innerHTML);
```

Using utility functions to navigate the DOM

A much easier way to navigate the DOM

```
var h1 = document.getElementById("hello");  
this.assertEquals("Hello, World!", h1.innerHTML);
```

```
var allHeadings = document.getElementsByTagName("h1");  
this.assertEquals(1, allHeadings.length);  
this.assertEquals("Hello, World!", allHeadings[0].innerHTML);
```

Working with attributes

```
var h1 = document.getElementById("hello");  
h1.style.background = "red";
```

Changing the content of an element

```
var list = document.getElementById("list");  
list.innerHTML = "<li>foo</li>"           // replace contents  
list.innerHTML += "<li>bar</li>"         // append contents  
list.innerHTML = "<li>zot</li>" + list.innerHTML; // prepend contents
```

Browser events

Executing when the page is fully loaded

```
window.onload = addBorderToHello;
```

```
function addBorderToHello() {  
    document.getElementById("hello").style.border = "1px solid green";  
}
```

Working with links

```
<ul id="list">  
</ul>
```

```
<script type="text/javascript">  
function doSomething() {  
    document.getElementById("list").innerHTML += "<li>another</li>";  
}  
</script>
```

```
<a href="#" onclick="doSomething();">Click Me</a>
```

Working with forms

```
<p id="validation"></p>
```

```
<form id="my-form" action="" method="get">  
  <input id="foo" type="text" name="foo" value="">  
  <br />  
  <input type="submit">  
</form>
```

```
<script type="text/javascript" charset="utf-8">  
  var form = document.getElementById("my-form");  
  form.onsubmit = function() {  
    var el = document.getElementById("foo");  
    var msg = document.getElementById("validation");  
    if (el.value.match(/^[a-zA-Z$][a-zA-Z0-9]*$/)) {  
      msg.innerHTML = "ok";  
    } else {  
      msg.innerHTML = "not a valid JavaScript identifier";  
    }  
    return false; // do not execute action  
  }  
</script>
```


A little Rails magic

```
<%= link_to 'Delete!',  
  { :action => :destroy, :id => document.id },  
  :confirm => 'Are you sure?',  
  :post => true %>
```

```
<a href="/books/destroy/121494" onclick="  
if (confirm('Are you sure?')) {  
  var f = document.createElement('form');  
  f.style.display = 'none';  
  this.parentNode.appendChild(f);  
  f.method = 'POST';  
  f.action = this.href;  
  f.submit();  
};  
return false;  
">Delete!</a>
```

Unit Testing

Choose one unit testing library

<http://testcase.rubyforge.org/>

TestCase

Nice JavaScript Testing Library

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Русский

Create a test file

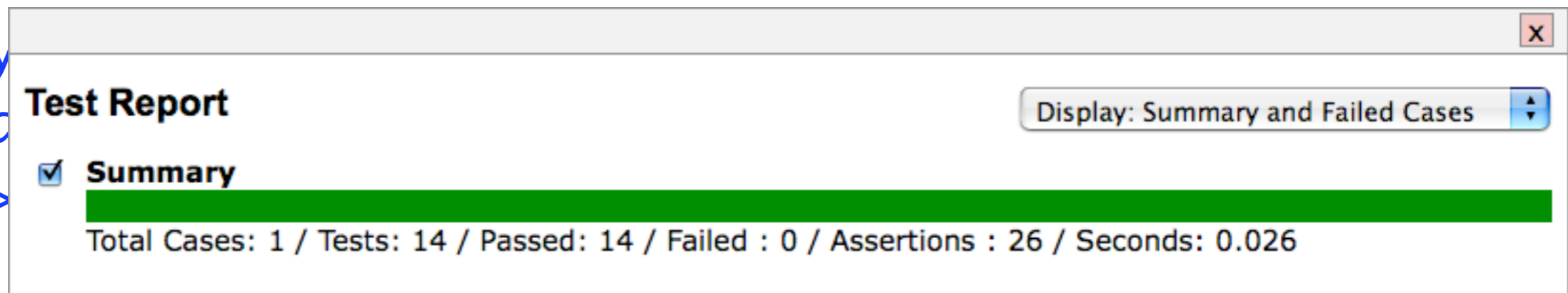
```
// file examples_test.js
var ExamplesTest = TestCase.create({
  name: 'Some test',

  testAddition: function() {
    this.assertTrue(2 + 2 > 3);
    this.assertEquals(4, 2+2);
  },

  testMultiplication: function() {
    this.assertEquals(16, 2*2*2*2);
  },
});
```

Create a runner html file

```
<html>  
  <head>  
    <title>Examples</title>  
    <script src="lib/testcase.js"></script>  
    <script src="lib/jquery-1.3.2.js"></script>  
    <script src="prod/production_code.js"></script>  
    <script src="test/examples_test.js"></script>  
    <script type="text/javascript">  
      ExamplesTest.runOnLoad();  
    </script>  
  </head>  
  <body>  
    </body>  
</html>
```



The screenshot shows a window titled "Test Report" with a close button (X) in the top right corner. In the top right of the window, there is a dropdown menu labeled "Display: Summary and Failed Cases". Below this, there is a checked checkbox next to the word "Summary". A thick green horizontal bar spans the width of the report area. At the bottom of the window, the following statistics are displayed: "Total Cases: 1 / Tests: 14 / Passed: 14 / Failed : 0 / Assertions : 26 / Seconds: 0.026".